Versatile electrochemial sensor for tissue culturing and sample handling

Bakmand, Tanya; Kwasny, Dorota; Al Atraktchi, Fatima Al-Zahraa; Castillo, Jaime; Svendsen, Winnie Edith

Published in:
Proceedings of the 15th International conference on Electroanalysis

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Versatile electrochemical sensor for tissue culturing and sample handling

Tanya Bakmand, Dorota Kwasny*, Fatima Al-Zahraa Al Atraktchi*, Jaime Castillo-León and Winnie E. Svendsen*

Technical University of Denmark (DTU), Department of Micro- and Nanotechnology (Nanotech), Nano Bio Integrated Systems (NaBIS) group (tanba@nanotech.dtu.dk)
* Technical University of Denmark (DTU), Department of Micro- and Nanotechnology (Nanotech), Nano Bio Integrated Systems (NaBIS) group

Culturing of organtypic brain tissues is a routine procedure in neural research. The visual inspection of the medium is the only way of determining the state of the tissue. At the end of culturing, post-processing techniques such as HPLC can be used to measure the concentration of the secreted metabolites in the waste products. Continuous measurements would enable improved monitoring as compared to the end-point assay. Here, we developed a sensor system capable of real time measurements of the analytes directly secreted from the tissue. The presented system can be readily integrated in the standard procedures allowing for better assessment of the progress of the culturing.

The sensor system was initially developed for monitoring of cells and tissue cultures but has lately been considered for, and tested in, a wide range of applications. Some of these include pathogen detection and integration in microfluidic devices for sample preparation.

In this work we present the development of the sensor system along with results on characterization by impedance spectroscopy and cyclic voltammetry. Furthermore we present recent results on integration of the sensor as well as amperometric detection of dopamine as a preliminary proof of concept.

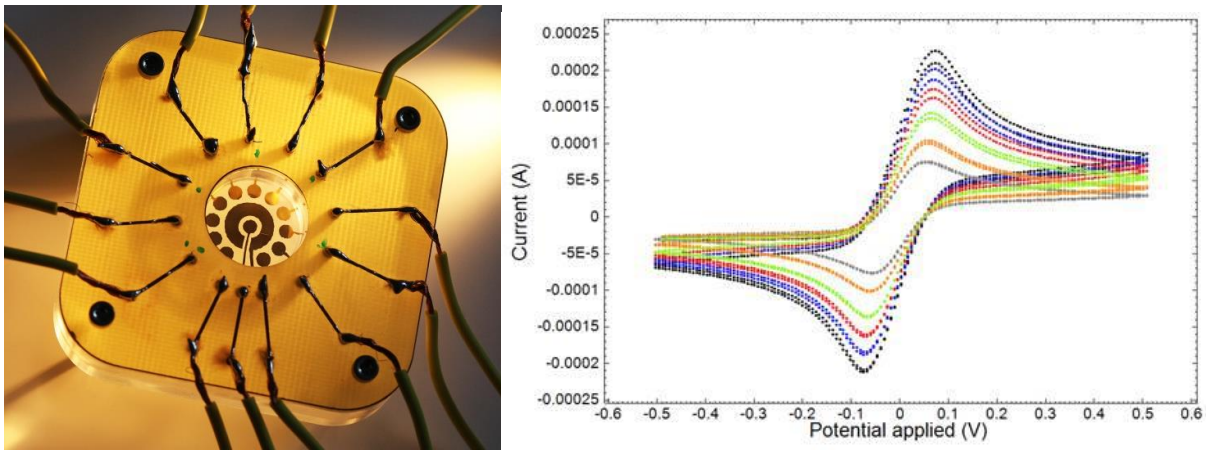

Figure 1. Left: Picture of a sensor prototype interfaced with PCB board. This setup has been used for characterization and analyte detection. Right: CV measurements in 10 mM ferri-ferrocyanide using sweep rates between 0.5 V/s and 0.05 V/s.